REVIEW.

A TREATISE ON CHEMISTRY.

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Vol. 1.—The Non-metallic Elements.

A HANDSOME 8vo. volume of 771 pages, well-printed, and beautifully illustrated, a book more for the drawing room, than for the study and the laboratory. It is a work of some pretensions, and coming as it does from two chemists, long and favourably known both as workers and teachers at one of our highest science schools, will probably have no inconsiderable influence on the teaching of chemistry in England. This influence we fear will not be a favourable one; among much that is commendable, its completeness, its full description of many fundamental experiments, the frequent employment of equations to express re-actions, &c., there is much that has to be condemned. The book abounds in loose and illogical writing, conclusions are drawn, which, though frequently correct in themselves, have no logical connexion with the premises from which they are supposed to be drawn, and thus the chief value, as an educational instrument, which can be claimed for science teaching, the training of the mind to exact logical reasoning, is lost.

The book opens with a short historical sketch based chiefly on the writings of Kopp. Next follow some chapters on general principles, well illustrating our above remarks. On page 43 we are told that a science may be called experimental as opposed to observational, "when we are able so to control and modify the conditions under which the phenomena occur as to produce results which are different from those which are

otherwise met with." Surely experiments are not merely, or even chiefly, for the purpose of producing results, not otherwise met with, but rather for the purpose of showing that certain phenomena are produced under such and such conditions, proving the correctness, or otherwise, of our observations or conclusions. On page 70, after a table giving the combination by volume of various elements, when in the gaseous condition we are told: "It is thus clear that *the number of atoms which is contained in a given volume of any gaseous body, must stand in a simple relation to that contained in the same volume of any other gas,*" whereas all that is really clear, is that combination by volume usually takes place in very simple ratios, and this might well be, nay probably is, the case without the existence of atoms. Again, on page 71 we are told, "From this train of reasoning, it follows, that an atom is the smallest portion of matter which can enter into a chemical compound, whilst a molecule, on the other hand, is the smallest quantity of an element, or of a compound, which can exist in the free state." This is simply a definition of what chemists at present understand under the term atom and molecule, but does not by any means necessarily follow from "this train of reasoning." On the same page we find the following strange logic. After defining the use of symbols and explaining that by placing symbols of elements side by side, a combination of these elements is signified, we are informed, "hence it is clear that the atomic weight of a compound is the sum of the atomic weights of its component parts," this again is simply a statement of observed fact, although it would have been better to have put it, that the molecular weight of a compound, &c., &c., but no more follows from what precedes it than—well the ideas of the authors as to what is clear, clearly differ from ours. The whole of these chapters seem to be written by men who have not clearly grasped the subject, and are therefore unable to place it clearly and logically before the student.

The descriptive part begins on page 95, commencing with hydrogen. On the whole, this part is far better done than the first, but even here we find many instances of what we have called loose writing. To give a few examples merely. On page 177 the preparation of oxygen from barium peroxide is described, and we are then informed that "this simple method has not unfortunately come into general use, as the baryta looses its power of absorbing oxygen," &c., &c., the unfortunate thing being, not that the method has not come into the general use, but that the baryta looses its power of absorbing oxygen. On the same page it is stated that the mixture of caustic potash and lower oxides of manganese, produced by the action of steam on heated manganate, "when again heated absorbs oxygen," where from? On page 178, we find "certain metals also absorb oxygen when in a molten state, and give it off again on cooling," they give it off, like water, on *solidifying*. But we must hurry on, on page 713 we have, "This crystal," &c., &c., "must now be placed in such a position, that the edge whose angle of inclination has to be measured, is placed exactly in a line with the axis of the instrument." It should of course be, the intersection of the two planes, whose angle of inclination to each other is to be measured, must now be placed, &c., &c. It is also unnecessary to place the intersection or edge, exactly in a line with the axis of the instrument, which would be almost impossible to accomplish, but it is *necessary* to place it *parallel* with the axis, and nearly coincident with it, and this *can* readily be accomplished, although we are not told in this book how to do it.

The work is, as before observed, very complete, nevertheless some things are omitted which seem to us would have been worth mentioning. The preparation of

hydrogen by the action of sodium is described, but no hint is given that there is danger of explosion, and of course no directions are given for avoiding it. Among the properties of oxygen, no mention is made that it combines, at ordinary temperature, with binoxide of nitrogen, or that it is readily absorbed by alkaline pyrogallates, and various other substances. In some cases we come also across bad chemistry, as for example on page 410, where the action of nitric acid on metals is incorrectly given, it is the hydrogen and not the metal that reduces the acid. On page 650, very erroneous ideas respecting urea are put forward; urea is the predominating nitrogen compound in the urine of man, not in that of animals generally.

The printing is on the whole well done, though there are misprints in the book not mentioned in the table of errata. On page 128 the tension of hydrochloric and vapour at—10 is given incorrectly; page 146, line 9 from the bottom, hydroiodic is printed for hydrobromic; page 177, line 8 from bottom, we have manganese for manganate, &c.

In conclusion, we must express our sorrow that we have felt obliged thus to write of a work on which both authors and publisher have evidently expended much labour and capital, and we sincerely hope that future editions may be free from the blemishes we have thought it our duty to censure in this.